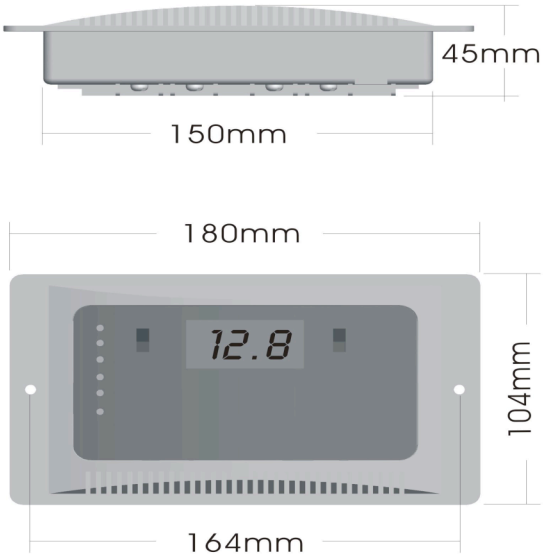
12 Volt 30 Amp Digital Solar Charge Controller

Installation & Operation Manual

This 30Amp charge controller is designed to protect your 12Volt Lead-acid or Gel-cell battery from being overcharge by solar panel, which prevents discharge of battery during nighttime. This controller reduces overall system maintenance and prolongs your battery life. It will continuously display the charging current or battery voltage in charging proceeding from LCD digital meter; also automatically indicate your battery condition from LED bar-graph. This controller is design to work with all kinds of 12 Volt solar panels for indoor use.

Controller Dimension



Features

- **Digital Voltage and Current** – Continuous display for battery and solar panels
- **Protect and Maintain battery** – Protect batteries from solar overcharge and maintains batteries in fully 3charged state
- **Battery Type selected** – Selected the Gel-cell or Lead-acid battery by selector switch
- **Safety circuit protection** – Short circuit and reverse polarity protection
- **Reverse leakage protection** – Protect batteries from solar power discharge
- **Status Lights** – Colored Battery condition bar-graph
- **Temperature Protection**– Over temperature protection and auto-resume

• **Terminal Block** – for easy wire connections
• **Mounting Options** – Can mount any surface or onto a wall

Installation and Operation

WARNING: Follow all safety precautions of the battery manufacturer. Proper ventilation must be provided for the batteries. Most batteries produce hydrogen gas when charging, which is extremely explosive. Provide adequate battery ventilation.
DO NOT Expose the battery to open flame, matches, cigarettes or sparks.
CAUTION: DO NOT EXCEED THE UNIT'S VOLTAGE AND CURRENT RATINGS:
• **Do not** exceed the maximum solar array voltage rating of 26 volts.
• **Do not** exceed the maximum current rating of 30 amps.
CAUTION: DO NOT DEVIATE FROM THE RECOMMENDED WIRING INSTRUCTIONS:
• **Do not** reverse Battery (+) and Battery (-) connections to the controller.
• **Do not** reverse the Battery and Solar Array connections to the controller.
• **Unplug** the controller from the solar array and battery before attempting any maintenance or cleaning.
• **Do not** disassemble the controller. Take it to a qualified service center when service or repair is required. Incorrect reassembly may result in a risk of damage the unit.
• **Installation** should be made by a qualified person.
• **Save** these instructions for future reference.
PERSONAL PRECAUTION:
• If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flush eye with running cold water for at least 10 minutes and get medical attention immediately.
• Never smoke or allow a spark or flame in vicinity of battery.
• Be extra cautious to reduce risk of dropping a metal tool onto battery. It might spark or short-circuit battery or other electrical part that may cause explosion.

1. Mounting

1.1 Mounting Consideration: - The solar controller is designed to be flush mounting or wall mounting.
1.2 Flush mounting: The flush mounted unit requires a rectangular cutout in the mounting surface with sufficient space (2-3 inches) behind to accommodate the controller.
1.3 Wall mounting: The wall-mounted unit is installed onto a wall surface using two mounting screws. Electrical connections are made to the back of the controller. Wiring can be run down the wall or through a hole in the wall directly below the controller.
1.4 Recommended Battery Capacity : 12V 45AH minimum.

2. Connection Procedures (refer to Connection diagram)

2.1 Fix the mounting of the solar controller panel.
2.2 Select Lead-Acid or Gel-cell Battery modes.
2.3 Connect the solar panel positive side to the solar controller ARRAY POSITIVE + by a suitable wire (Be careful not to short circuit the solar array.)
2.4 Connect the solar panel negative side to the solar controller ARRAY NEGATIVE– by a suitable wire
2.5 Connect the Lead-Acid or Gel-cell battery positive side to the solar controller BATTERY POSITIVE + by a suitable wire.

2.6 Connect the Lead-Acid or Gel-cell battery negative side to the solar controller BATTERY NEGATIVE – by a suitable wire.

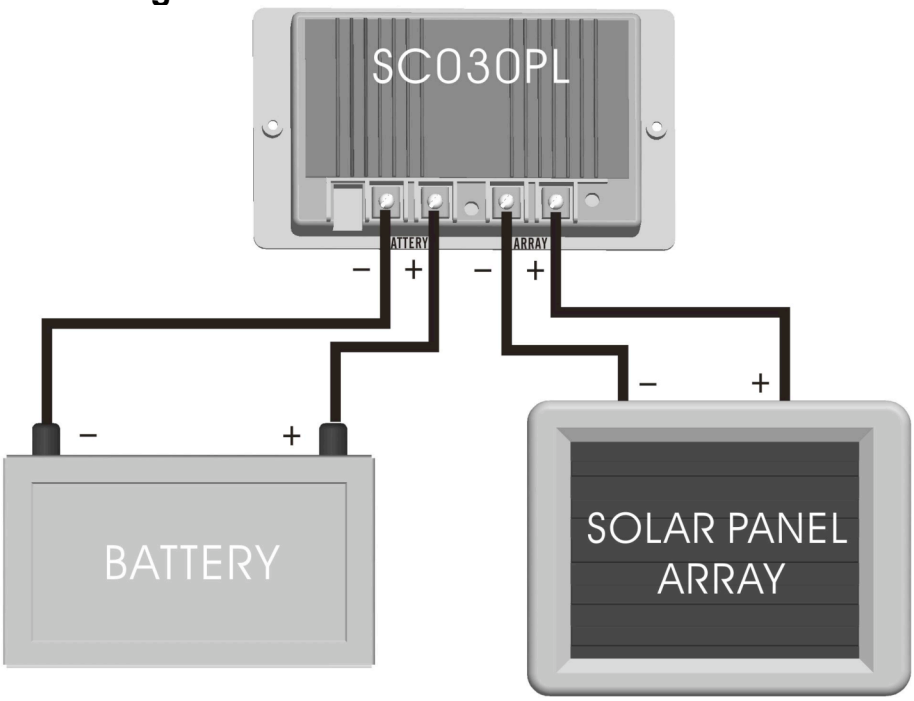
Any wiring variation of size or length can affect the LCD meter performance

3. Wire size: - Refer to the "WIRE SIZE" chart below to determine the minimum size wire needed for each connection. Note that the bigger the wire, the lower the AWG. When using large stranded wire, you may need to divide the ends into two groups and straddle the screw on the terminal block. (Based on maximum current)

	Battery Connection Distance round trip (meter)	**Solar Array Connection Distance round trip (meter)**
Length of Wire	< 0.6m	6m 9m 12m
AWG	6 or 8	10 8 6

4. Wire type: - When possible, use stranded wire instead of solid wire. Stranded wire does not fatigue and cause loose connections over time as easily as solid wire. Use red wire for (+) and black for (–). Accept one wire at 6 AWG (stranded) or two wires at 8 AWG. Use crimp connectors or connect the larger wire to a short, thinner wire using a wire nut (solder these connections).

5. Connection diagram



CAUTION: Don't attempt to change the battery type selector switch after the controller proceeds charging, otherwise will affect LCD meter reading.

6. OPERATION

After completed above connection, the solar controller charges the battery automatically. The solar controller is based on three stage charging algorithm such as Bulk charge mode, Constant-voltage mode

and Float mode. During charging period, you can change the select switch to read the battery voltage or charging current from LCD meter at any time.

- Battery condition detect by LED bar-graph. The controller can indicate the battery condition with three states: GOOD, FAIR, LOW.
- PWM constant-voltage regulation to prevent heating and excessive battery gassing. Pulse charging to restore full battery capacity.
- Float: After battery is fully competed charged, the battery voltage will reduce to a lower regulated voltage in which safety maintains the battery at full charge.

7. Specifications

Technical Specifications		
PARAMETERS	**UNITS**	**DATA**
ELECTRICAL:		
Normal input solar cell array voltage	Volt	16.5~22
Max input solar cell array voltage	Volt	25
Max charging current:	Amps	30
Charging start when Battery voltage not less than	Volt	5.0 +/-0.3
Current Consumption when connected 15V Array (Battery not present)	Milliamps	25Max.
Current Consumption when connected 12V battery (Array not present)	Milliamps	25Max.
PWM Constant-voltage for Gel-cell battery	Volt	14.1 +/-0.3
PWM Constant voltage for Lead-acid battery	Volt	14.5 +/-0.3
Float mode voltage	Volt	13.4 +/-0.3
METER DISPLAY:		
LED Bar graph indicated range (Battery Voltage status) LOW LED FAIR LED GOOD LED	 Volt Volt Volt	 <11.5 +/-0.3 11.5 to 12.5 +/-0.3 >12.5 +/-0.3
LCD Meter Accuracy- DC Voltage	Volt	1.25%
LCD Meter Accuracy- DC Current- at 5~30Amp	Amps	3%
PROTECTION:		
Over temperature protection starting at (Stop charging)	ºC	>80
Over temperature protection reset at (Restart Charging)	ºC	<65
MECHANICAL		
Controller Dimension	mm	180 (L) x 104(W)
Controller overall Height	mm	Approx. 45
Net weight	g	Approx. 350
ENVIROMENTAL CHARACTERISTIC:		
Operation temperature	ºC	-5 to 50
Storage temperature	ºC	-10 to70

Operation humidity range		0 to 80% RH

MONITORING

1. LED Indicator
The 6 LEDs indicate charging status and battery conditions. These function are described below

Solar Power Indication (POWER LED-red)

ON: Indicates solar panels have proper connection and solar power source supplied.
OFF: No power available or insufficient voltage to active charge controller.

Charging status ("CHARGING" LED-blue; "CHARGE COMPLETE" LED-green)

CHARGING LED: ON indicates the battery is charging, virtually all the power from the solar array pass through to the battery.
OFF indicates the solar panel voltage is too low. (insufficient daylight)

CHARGE COMPLETE LED: ON indicates fully charge reached, a small "FLOAT" charge continues to optimize battery when need.
OFF indicate the full charge has not been completely reached.

Battery conditions
GOOD LED: ON indicates the battery voltage is over 12.5V, usually indicates when the unit is charging.
FAIR LED: ON indicates the battery voltage is between 11.5 to 12.5V and needs charging.
LOW LED: ON indicates the battery voltage is under 11.5V and needs charging.

The LOW LED will be blinking if battery is unconnected to the unit.

2. Digital LCD meter
A digital LCD meter is available on this controller; it will continuously display battery voltage or charging current. You can select the Current-Volt slide switch at any time by front panel. If the slide switch places at the middle position, the LCD meter will OFF.

AMP □□.□ indicate the charging current with 3 digitals, for example: 29.5 amps

VOLT □□.□ indicate the battery voltage with 3 digitals, for example: 12.8 volt

MAINTENANCE

1. Check to confirm all wire connections are sound and free from corrosion. Tighten terminal block screws, the array connections and battery terminals.
2. Visual Check of Solar array and battery output cabling for signs of overheating, damage and cracking:
3. Verify each LED status whether it meets the specifications or not.
4. Recommended the above maintenance is carried out at least every 3 months

TROUBLE SHOOTING

1. The system of solar Panels-Controller-batteries is not sized incorrectly-The batteries will be under-charged if the solar array is too small, or if the battery bank is too small, or if the usage is too high.

2. Solar panel's problem - Solar panel can be seriously affected by the angle of the panel (as in winter months), minor shading, high level haze (barely visible) and dust on the panel.

3. Battery's problem - If the battery is going bad, a little charging or discharging will cause a large

change in the battery voltage. A battery short somewhere can also reduce the battery voltage.

4. Controller incorrect connection - Include reversing the polarity from the panels or batteries, or switching the array and battery connections.